

NOTES ON THE HISTORY OF THE SCIENCE MUSEUM.

THE recent discussions relating to the Science Museum have brought to the front several important questions connected with the utilisation of land for public purposes connected with science and the arts. They have occurred, too, at a time when the Royal Commissioners for the Exhibition of 1851, who in times past have behaved so generously in selling their land at a nominal price, have now parted with the last square yard of it which can be used for the high purposes determined upon by the late Prince Consort when it was placed at his disposal by them.

It seems desirable, therefore, to bring together as briefly as possible the facts touching the various allocations of the land which have been made from time to time. In this way we shall be able to touch upon some of the circumstances which have arisen regarding museum sites during the last half-century. Further, we shall be led to recognise the vast benefits which have been conferred upon the nation by the Commissioners' action.

The present site of the new Victoria and Albert Museum to the east of Exhibition Road was the first thus devoted in 1858, after the partnership between the Commissioners and the Government had been dissolved, chiefly to the purposes of Art, although a small Patent Museum ("the Boilers") had before that year been erected by the Government at a cost of 15,000*l*.

Next came the plot on the south face of the main square of the Commissioners' estate, facing Cromwell Road. This was the largest plot conveyed to the Government for national purposes, and its transfer was made memorable by a remarkable speech by Lord Palmerston concerning the Cabinet's decision to purchase it, and the uses to which it was proposed to apply it. In this speech (*Hansard*, June 15, 1863), Lord Palmerston, the Prime Minister, took pains to show the generous action of the Commissioners. Some extracts from this speech may be given.

"Sir, I rise to propose the Vote of which notice has been given, for the purchase of land and buildings on the site of the Exhibitions of 1851 and 1862. This City of London may, without exaggeration, be called the commercial capital of the world. It ranks high among the great political centres of civilised nations, and in point of wealth and population it may very fairly be stated to exceed any other European city. But the very circumstances which I have mentioned—the great wealth and great population of the City—have tended progressively to impair the architectural and ornamental character of the town. Our streets are narrow, our open spaces few and small, our public buildings are not many, and, respecting those which do exist, differences of opinion prevail as to their propriety of ornamentation and architectural design. We have not, in this town, what are to be found in many smaller towns upon the Continent, a great number of splendid palaces belonging to individuals. When we have mentioned Northumberland House, and, perhaps, Lansdowne House, if we are called on to enumerate other great ornamental constructions, we shall be driven to the, no doubt, very beautiful collection of apparent palaces—the clubs in Pall Mall, many of which are imitations of beautiful palaces on the Continent. In all the Italian towns, at Prague, and in most German towns, there are large piles of ornamental buildings which represent the wealth and taste of the nobility of those countries. What is the reason of that? What is the reason of the inferiority of this city as compared with other first-rate towns, in regard to the conditions of the space occupied by

and the character of the buildings? The great run of the private houses of London may really be termed mean. I am not speaking of those more lately constructed, which are on a better plan; but the old red-brick houses of London are low, they are destitute of architectural ornament, and may be said to be mean in their character. What is the cause? It arises from the great value of the ground—from the immense competition which the wealth of the metropolis causes for the small spaces of ground. People are unable to buy a large quantity of ground on which to construct a house, and, having paid dearly for such a portion of the land as they require, they have smaller disposable means for the erection of ornamental and handsome structures. The price of land in London is very great. I will just mention a few instances to show the value that attaches to the surface in this great town. . . . Therefore I say that the natural progress of wealth and civilisation tends to add greatly to the value of land to be covered by buildings in the interior of towns; and admitting that there are certain requisites which are necessary for the development of the public establishments and buildings, the question arises where the land for such purposes can be acquired, and whether we should look for it in the centre of the town, where everything is covered with valuable property, or whether we should embrace the opportunity of acquiring it at certain greater distances, but still within reach for all the purposes to which it is to be applied. Well, we hold that the land held at Kensington by the Commissioners of 1851 does afford the means of providing for our immediate and prospective wants, and we are able to get land there for our immediate purposes on terms infinitely cheaper than those on which land can be acquired nearer the centre of the metropolis."

Having shown how the question was dominated by the price of land in various parts of the metropolis, Lord Palmerston passed to the then requirements of the Government. The chief of these was an expansion of the Patent Museum before referred to, and also of the British Museum.

In 1859, two years after the establishment of the Patent Office Museum, the Commissioners of Patents laid a Report before Parliament, in which the following passage occurs:—

"It is intended to make the Patent Office Museum an historical and educational institution for the benefit and instruction of the skilled workmen employed in the various factories of the kingdom, a class which largely contributes to the surplus fund of the Patent Office in fees paid upon patents granted for their valuable inventions. Exact models of machinery in subjects and series of subjects, showing the progressive steps of improvement in the machines for each branch of manufacture, are to be exhibited; for example, it is intended to show in series of exact models each important invention and improvement in steam propellers (steamboat propulsion) from the first engine that drove a boat of two tons burden to the gigantic machinery of the present day, propelling the first-rate ship of war or of commerce. The original small experimental engine that drove the boat of two tons burden, above referred to, is now in the museum."

Add to these illustrations of applied science similar illustrations of the instruments used in the advance of pure science, and we have a picture of what is required in the Science Museum of to-day.

Lord Palmerstone thus referred to the needs of this museum:—

"Now, the question is, what do we want? What are the requirements that press on the Government? In the first place, we want a Patent Museum. Any one who considers the value of a great collection of

models and inventions to those employed in the mechanical and productive arts of the country must know that it is of great importance that they should have access to a repository in which they can find everything connected with that particular department of industry to which they have devoted themselves. In America, a country not supposed to be addicted to unnecessary ornament, but where a great disposition is shown to practical improvement, there is a Patent Museum which covers eleven acres. Well, we do not propose a museum of such dimensions. I think that about three acres will be sufficient for all present needs in regard to a Museum of Patents."

He then passed on to the British Museum requirements:—

"Then we want an addition to the British Museum. The question then arises where that addition is to be found—whether the land is to be had by purchasing land in immediate contiguity to the British Museum, or by the purchase of land at Kensington, as we propose. Calculations have been made that eight acres are required, but that is, I think, more than is necessary. I think that five acres would be a nearer approximation, and three acres have been named as the smallest amount of space that is required."

Next we have a reference to the National Portrait Gallery, room for which was eventually found elsewhere:—

"We have got together, at some expense and trouble, a most interesting collection of portraits of distinguished men connected with the history of the country. They are now placed in a house where they cannot be seen, and it is urgently desirable to have a better building in which to place that Portrait Gallery. Then we have a Museum at Kensington, full of most valuable and instructive productions, and a Committee of the House of Commons that sat two or three years ago strongly recommended additions to that institution."

"Now, we calculate the cost of these various augmentations—supposing that the land were bought in the metropolis and at the rate which it now bears—as follows:—If eight acres are taken for the British Museum, the cost of land will be 390,000*l.*, and the buildings 824,000*l.*, making a total of 1,214,000*l.* If five acres only are required, the land will cost 240,000*l.* and the building 567,000*l.*, making a total of 807,000*l.* Supposing the lowest estimate of three acres to be sufficient, the land will cost 150,000*l.* and the building 300,000*l.*, making a total of 450,000*l.* I then take the Patent Museum, which will require three acres. The land is set down at 100,000*l.* and the building at 100,000*l.*, making together 200,000*l.* . . . The Portrait Gallery will require half an acre, and we calculate will cost 25,000*l.* for land, and 25,000*l.* for the building, or together 50,000*l.* These sums would come to the following total:—If you take eight acres for the British Museum, the total for all these buildings will be 1,514,000*l.*; if you take five acres, 1,107,000*l.*; if three acres, 750,000*l.* Assuming that these are wants which Parliament may think it proper to meet, these would be the sums you would require if you took land now occupied by houses in any central part of town. Now, the proposal that we make is one which the Committee will see is a very economical one. By the plan which we recommend we should have much more space and at far smaller expense. The arrangement that we propose is, that the public should purchase seventeen and a half acres. (Several hon. Members: Sixteen.) No—seventeen acres of the land belonging to the Commissioners, which is now covered with the building in which the Exhibition took place. For that land the Commissioners are willing to take 120,000*l.* My hon. friend will admit that to get seventeen acres

of land at about 7000*l.* per acre, for which we should pay 50,000*l.*, 60,000*l.*, or 70,000*l.* an acre elsewhere, is a considerable advantage."

It will be gathered from this speech what an enormous saving had been effected by paying such a low price for the land. The plot in question was sold for half its then value, thus presenting the public with 120,000*l.* In the conveyance a covenant was inserted restricting the use of the land to purposes connected with Science and the Arts.

In 1863 the only land to be obtained on these low terms was the large plot purchased from the Royal Commission of 1851, capable of containing the Patent Museum, the Natural History Museum, and other institutions; but by 1869 there was another plot available for the building of a Natural History Museum. This plot consisted of land reclaimed from the Thames near Hungerford Bridge by the construction of the Embankment. As no action had yet been taken on the Cabinet decision of 1863, referred to in Lord Palmerston's speech, concerning the Natural History Museum, it was suggested that it should be built here, and a Select Committee was appointed to inquire into the matter. Their first report was published on May 10, 1869 (Report of Select Committee on Hungerford Bridge), and this was soon followed by a second.

These reports and their accompanying plans are a mine of information, especially in relation to the then stated requirements of biologists with regard to the natural history collection.

It has already been shown that the demands for space for these collections before the Government in 1863 were three acres and eight acres, and that Lord Palmerston compromised with five acres, which were to be provided for out of the sixteen and a half acres purchased from the Royal Commission of 1851.

In the interval between 1863 and 1869 further inquiries had been made, as will be gathered from the following extracts of the evidence (second Report):—

"Examination of Prof. Owen, p. 107.

"2343. [Mr. Cowper.] Will you state, according to your present views, what area you think necessary for properly providing for the natural history collection?—Mr. Hunt, in 1863, went carefully into all those details and questions with me and ultimately embodied them in a plan, which is printed in a Parliamentary paper. He arranged the building for present actual wants on a space of three acres, and I asked for two additional acres for later additions, looking forward to the next thirty years."

"2344. Is that your present view of the subject?—It is so."

"Examination of Prof. Huxley, p. 112.

"2422. [Mr. Tite.] Probably three acres might include it all?—Yes. I reckon that five times the space now occupied by the bird-room in the British Museum (taking that space at 15,000 square feet) would suffice for the erection of a building in which the largest zoological collection that can ever be formed may be displayed and preserved in a manner most advantageous to the public and to men of science. Thus, for zoology, I ask, say, an acre and three-quarters; I should provide another 15,000 square feet for the fossils, and half as much for the mineralogical collections; and half as much for the botanical collection, if any such collection is to be taken to the new site. This makes a sum total of about two acres and a half, and half an acre for margin, offices, and residences, and the like, and I believe that ample provision will be made not only for all present, but for all future, needs of a great national natural history museum. In saying that, I think the building ought

to be of only one storey, and top-lighted; I mean so far as it is devoted to museum purposes. But I think that the museum galleries might be conveniently supported on a side-lighted ground floor, which would afford ample room for the library and offices.

"2423. [Mr. Layard.] Of course, when I asked you the question about the space, I meant to include all the natural history collections, together with the collections of mineralogy, zoology, geology, osteology; in fact, everything that appertained to the department of science in the British Museum?—My first answer had reference entirely to the zoological collection; but if you wish to add the other collections I should say, speaking roughly, another couple of galleries, making, say, seven altogether, would be sufficient, but that is, of course, a mere estimate, and a very moderate one."

The plans show that the building proposed on this site covered about $3\frac{3}{4}$ acres, and there was little, if any, room for expansion, as the District Railway and wide roads had to be provided for, and it was proposed that the latter should bound the area available for museum purposes.

Ultimately this scheme was given up, and the South Kensington site was fixed upon, the building covering the same ground— $3\frac{3}{4}$ acres—as that proposed for the Hungerford Bridge site.

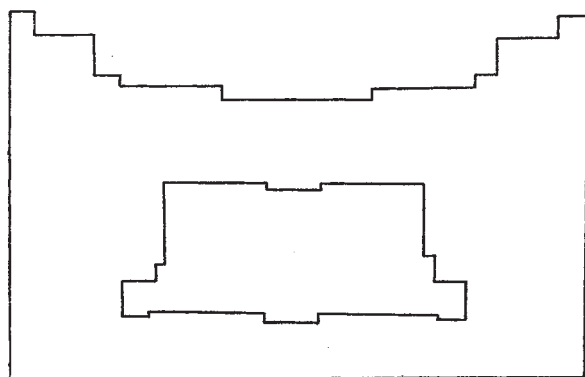


FIG. 1.—Plan of plot and building erected on it.

It would seem that between 1863 and 1869 the question of the Patent Museum had dropped into the background, for the plan ultimately adopted for the Natural History Museum was allowed to sprawl over nearly the whole of the plot as shown in the copy of the map published in the sixth Report of the Commissioners of 1851 (1879). It thus put difficulties in the way of using the unoccupied land. I give another plan, which shows that two museums of the same plan and size, say a Natural History Museum and a Patent Museum, could have been built on the land, leaving some eight acres for future extensions. Of course, if this had been carried out, any desirable change in the plan might have been made.

It would seem also that all the data collected in 1863 and 1869 had either been forgotten or shown to be worthless, for there is nothing that I know of in the shape of public documents to show, until long afterwards, of what part of the $16\frac{1}{2}$ acres bought the British Museum Trustees might consider themselves to be in possession. The land all round the museum was necessarily planted and laid out as gardens, because at the time it was not used for building purposes.

The first thought seems to have been given to this matter in 1881, after the erection of the building. A fence was erected to cut off the land to the north, and

the new museum then found itself in the centre of a square containing more than $12\frac{1}{2}$ acres. Shade of Owen! shade of Huxley! The first had asked for three acres, and two more to cover the expansion of thirty years, and the latter three acres, in which "the largest zoological collection that can ever be formed may be displayed and preserved in a manner most advantageous to the public and to men of science."

The second thought was given to this subject in 1899, when a new north boundary was considered. This added one and a half acres more land, making more than fourteen acres in all.

There is no doubt that the Government then allocated this land for Natural History Museum purposes. In the recent "Correspondence" (Cd. 5650, p. 1) a letter of 1910 is printed, quoting a letter of 1899 "with reference to the boundary line between the ground which it was then contemplated should be allotted for the use of the Natural History Museum and that provided for the use of the Education Department (Science Museum).

"It was then arranged that a boundary should be fixed, as shown upon the plan, which was forwarded to your predecessor at that time, and it was decided that all the land to the south of that land should be regarded as ear-marked for the future of the expansion of the Natural History Museum."

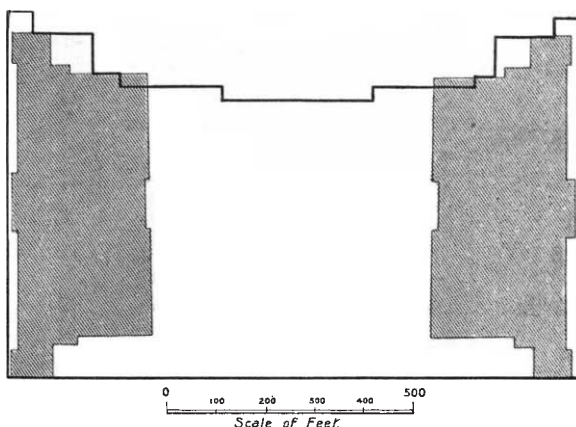


FIG. 2.—Plan showing what might have been.

As the building covers $3\frac{3}{4}$ acres, this allocation provided $10\frac{1}{4}$ acres for future expansion.

Incredible as it may seem, this is more by an acre than the area of the parent institution in Bloomsbury at the present time; an area required to garner all the collections on all subjects except natural history, made since 1753, say during a century and a half. Until 1907 it occupied seven and a half acres. In 1907 five and a half acres additional were bought, making thirteen in all.

To state this fact is to show that something had gone wrong somewhere. Had someone blundered?

This does not seem to be impossible, for the Government has recently been led to reconsider the matter. We read in the "Correspondence" referred to:—

"The Treasury and this Board [of Works] have had no desire to disturb the arrangement then [in 1899] arrived at so long as the occupation of this land by the Natural History Museum does not affect injuriously the interests of any other Department."

"The land and the Museum Buildings being vested in the Commissioners of Works, are the property of his Majesty's Government, and they are bound, therefore, in the interests of the public, as a whole, to consider without prejudice whether the time has not

now arrived when some modification of that boundary [that of 1899] should be made."

The "Correspondence" goes on to say:—

"There can be no doubt that, whatever shape the new Science Museum may ultimately take, it will be necessary to build up to the boundary line, and it is probable that, in order to safeguard both the Science Museum and the Natural History Museum from fire, and to lay out the ground to the best advantage, it may be necessary to construct a road, to be used privately between the two buildings."

In later "Correspondence" (Cd. 5673, p. 3) a block plan is given in which the revised boundary is indicated by the proposed road.

This proposed road, if constructed, involves the

proposed to construct the new private road for the special purposes of the Science Museum. This new road will have to run from Exhibition Road to Queen's Gate, a distance of 1170 feet, and will absorb at least three-quarters of an acre of ground. The architects of the Imperial Institute and the Imperial College between them absorbed three acres in their new road running between the same termini.

It must be pointed out that the proposed new road will run parallel to, and only fifty feet away from, the existing road, which has served the purposes of the Natural History Museum for the last thirty years. Curiously enough, this road is not shown on the block plan.

Even a Quartermaster-General proud of his depart-

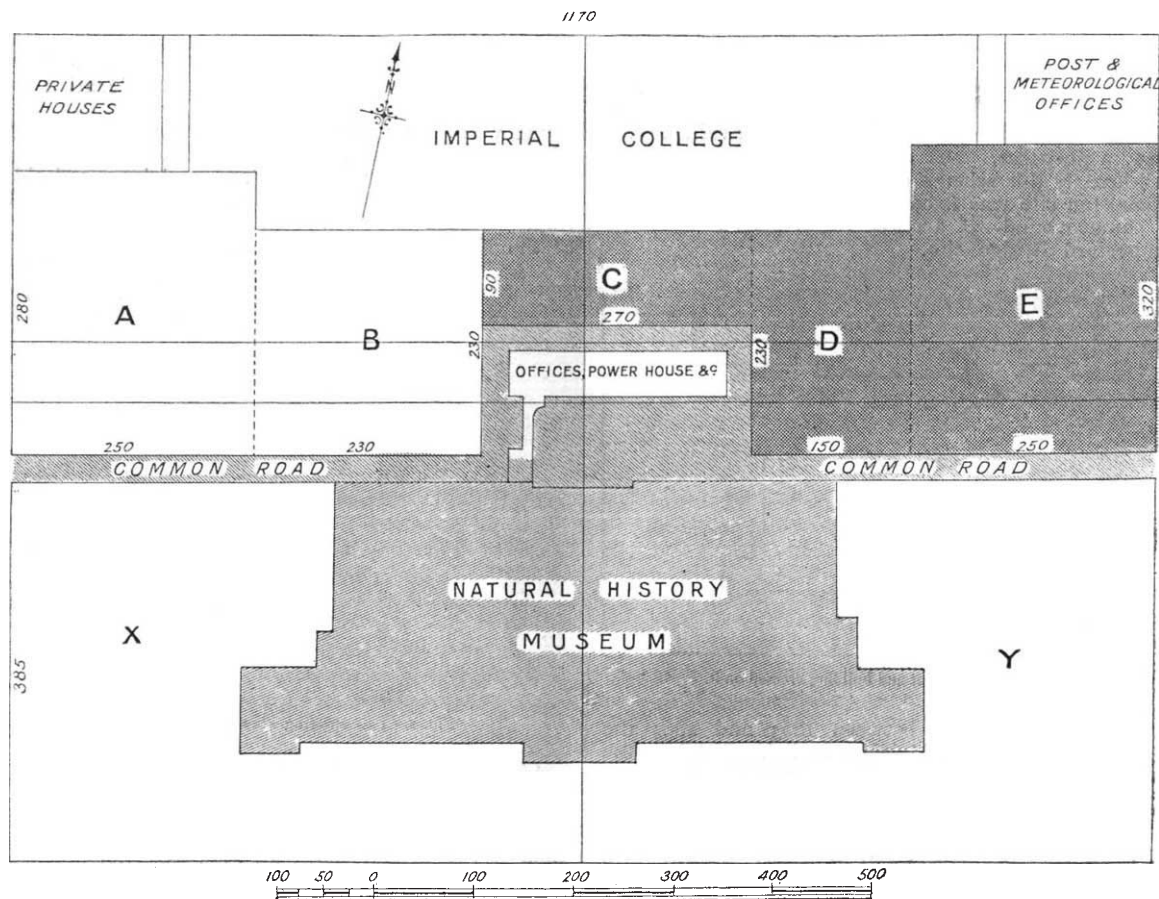


FIG. 3. Plan showing utilisation of the existing road and spirit museum building.

destruction of the building of the spirit museum. It is the inflammable nature of the contents of this building which has been objected to, and not the building itself, which might from its position be conveniently applied to many uses for one or both museums.

This action of the Government in changing the boundary has withdrawn the one and a half acres additional land included in the boundary in 1899; but that still leaves the Trustees in possession of twelve and a half acres, two and a half times what was asked for in 1869 by their responsible officer to provide for a thirty years' expansion.

The newly defined frontier is really the old line of fence erected in 1881, to the north of which it is

ment would scarcely recommend the construction of two parallel roads fifty feet apart, especially where every square foot of space is so precious and is being so hotly contested.

The question arises whether the existing road is not really the best boundary. This I referred to in my letter to *The Times* of May 30. It would serve the purposes of the two museums as regards fire precautions and other matters; no sacrifice of space for a new road, no breaking up of frontages, and no destruction of the spirit museum would be necessary.

Further, the existing road when the boundary was thus established could be made to enclose the body of the spirit museum, which might remain for use as offices, workshops, or other convenient use, in a

central backyard, away from any frontage; this, as well as the road which would be carried round it, would be common to the purposes of both museums.

In the accompanying plan (Fig. 3) I have shown

gardens, until they are built over, as an embellishment of the south front. I append photographs showing the present condition of the ground and how it would appear if the Science Museum were built to



FIG. 4.—Things as they are.

blocks A, B, C, D, E, which could then be used for the Science Museum; the area is six acres.

With regard to the Natural History Museum, it may be stated that with the three boundaries above referred to the included areas are as follows:—

	Feet	Acres
Boundary fixed in 1889	1170 × 530 = 14'2	
Proposed road	1170 × 470 = 12'6	
Existing road	1170 × 415 = 11'1	

harmonise with the Victoria and Albert Museum across Exhibition Road.

In the photograph the frontage is shown broken by the road, but there is no necessity for this if for any reason it would be better to continue it for the purposes of either museum.

If the blocks C, D, E, were built on first, the combined area of the building, just over three acres, would be a little less than that of the Natural History

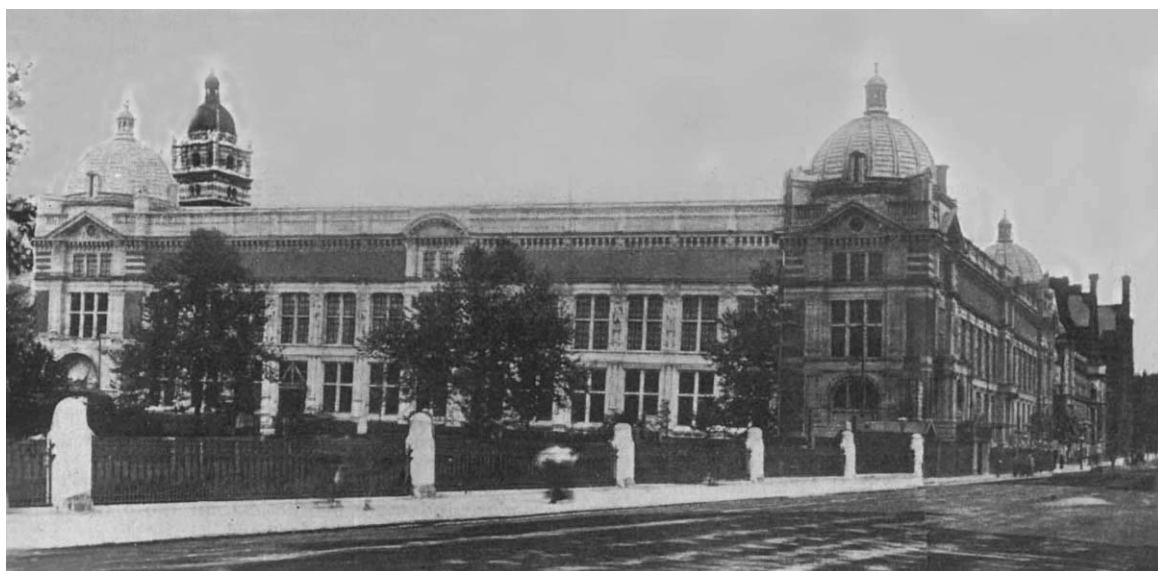


FIG. 5.—Things as they might be.

If the existing road boundary were chosen the road could not only be used for the purposes of both the Natural History and Science Museums, but part of the latter could be built along it, thus utilising the

Museum; the blocks A, B, might remain for expansion of the Science Museum, as the equivalent of the blocks X, Y, in the case of the Natural History Museum.

I believe that if such a scheme as this were put forward as a compromise, those who declined to consider it as a way out of the present *impasse* would put themselves in the wrong, in the minds of straight-thinking people who know the history of the question and the requirements of science taken as a whole.

It must be remembered that these museums, to obtain their highest use, must be in close association with institutions in which teaching of the corresponding sciences is carried on, and reciprocally the institutions for higher teaching and research which are already housed at South Kensington require museums of the several sciences in the immediate neighbourhood. In view of these requirements, the removal of one or other of the museums to a distant site is not a practicable alternative. By the compromise here suggested a real Science Museum, in its widest sense, would be established, with two branches dealing respectively with the natural history and the physical and mechanical sciences, in immediate contiguity to the Imperial College. It only wants a consideration of the many memorials presented to the Government since 1858, and of the recommendations of the Duke of Devonshire's Royal Commission of 1874, to be perfectly certain that in the future the two museums will be under one master instead of two.

NORMAN LOCKYER.

EARTHQUAKES AND LUMINOUS PHENOMENA.

IN vol. xiv., No. 6, 7, and 8, of the *Bollettina della Societa Sismologica Italiana*, we find a very long paper by Dr. Ignazio Galli on the collection and classification of luminous phenomena observed at the time of earthquakes. After an introduction, he considers that which might be excluded and the difficulties first met with in the formation of a catalogue of the phenomena he discusses. The illustrations which he gives of luminosities and other strange phenomena which have appeared at or about the time of earthquakes are 148 in number. The date of the first is 89 B.C., and the last March 30, 1910. These descriptions occupy 184 pages. The various luminosities are classified under more than twelve heads, and to these are added the number of times that earthquakes have been associated with vapours, smoke, and odours of sulphur or bitumen.

Seismologists have known for years past that certain earthquakes are said to have been accompanied by appearances of the Aurora Borealis, glimmering lights in the sky, fire-balls, *ignis fatui*, lightnings, corrustations and emanations from the soil, but this is the first time so large a collection of these phenomena have been brought together for their consideration.

When resident in Japan the present writer made many experiments extending over some years on electrical and magnetic phenomena associated with seismic disturbances. He also collected material from all parts of the world which bore upon these associations. One conclusion arrived at is that it is an undoubted fact that at the time of certain large earthquakes, as, for example, the one which in 1906 destroyed Valparaiso, curious lights which, in this instance, were compared to those of chain lightning, have been seen playing across the hills in the epicentral region. Observations of this nature led the writer to make experiments at Shide, in the Isle of Wight, and at the King Edward VII. Mine at Camborne, in Cornwall. The object was to determine whether there was or was not at

the time of a large earthquake a practically instantaneous transmission of energy to distant regions other than that recorded by seismographs. It was observed, and still is observed, by many persons that the face of a very large chalk pit at Shide exhibits, after dull damp days, a flaring luminosity. In a chamber at the end of a tunnel in this pit, a cylinder carrying photographic paper was installed. This cylinder was enclosed in a box, one end of which was a metal plate containing three holes. The plate touched a flat chalk surface. The cylinder took one week to turn; therefore parts of the paper before the holes were very slowly exposed to a chalk surface about $3/16$ th of an inch distant. On certain weeks the results were nil. Other weeks, after the development of the paper, there were three dark bands corresponding to the position of the holes, suggesting that the chalk had acted like an extremely feeble light. Another experiment was to place small pieces of photographic paper in envelopes, a certain number of which had a small glass window; these were placed against the face of the chalk. The image of the windows was frequently obtained, but nothing more than the effects of damp was found upon the others.

The conclusion arrived at was that the photographic effects were in no way connected with radio-activity, but they were probably electrical. The effects obtained in the granite of Cornwall were very marked and, like those observed in the Isle of Wight, varied in their intensity. As to the possibility of these effects being due to micro-organisms, a number of investigations were made, but there were no indications that organisms obtained from the chalk surfaces were connected with luminosity.

Whether these observations throw light upon differences in climate observed at different places, even though they may be near to each other, is a matter for conjecture, but future researches may show that the well-being of living things on the surface of our earth is more dependent upon its radiations than has hitherto been imagined.

I venture to refer to these experiments to show that the outcome of observations similar to those catalogued by Dr. Galli have not been overlooked in this country.

The 148 detailed descriptions which he has collected are used as subject-matter for twenty-six analyses. For example, did lightnings, thunderstorms, meteors, beams of light, luminous clouds, hot vapours, and other appearances precede, accompany, or were they noted after an earthquake? Dr. Galli says that sixteen of these analyses are nothing but the analytical *résumé* of the various phenomena which have been observed, and they therefore possess a real value which cannot be sensibly altered by any report that is ill-founded or untrustworthy. The remaining ten are provisional conjectures which await the judgment of physicists and seismologists. They will be confirmed or contradicted by future observations. If they fail, either partly or entirely, they will at least have the merit of having put the question as to certain probable causes of luminous phenomena connected with earthquakes. At the same time, as one heartily wishes, they may suggest hypotheses which are better, broader, and more synthetic than those the writer of the paper has brought forward.

Dr. Ignazio Galli is to be congratulated on his work, which directs attention to a neglected branch of seismology. When a face of rock 100 or more miles square is rudely pushed over another face, equal in area, it seems reasonable to suppose that such an adjustment should be accompanied by luminous and other phenomena.

JOHN MILNE.